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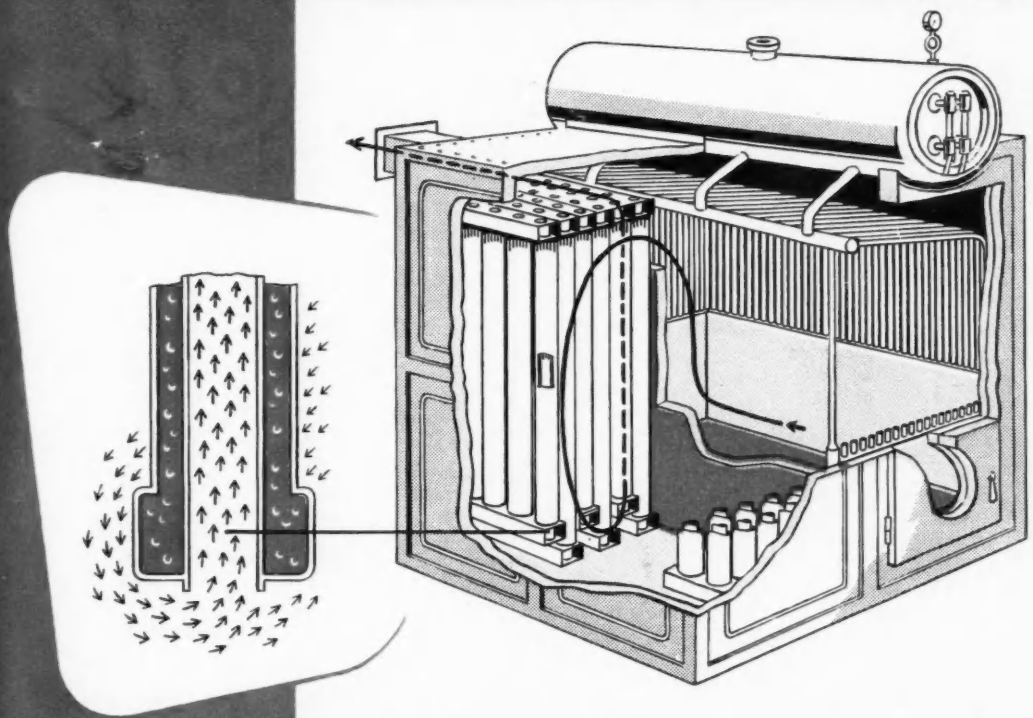

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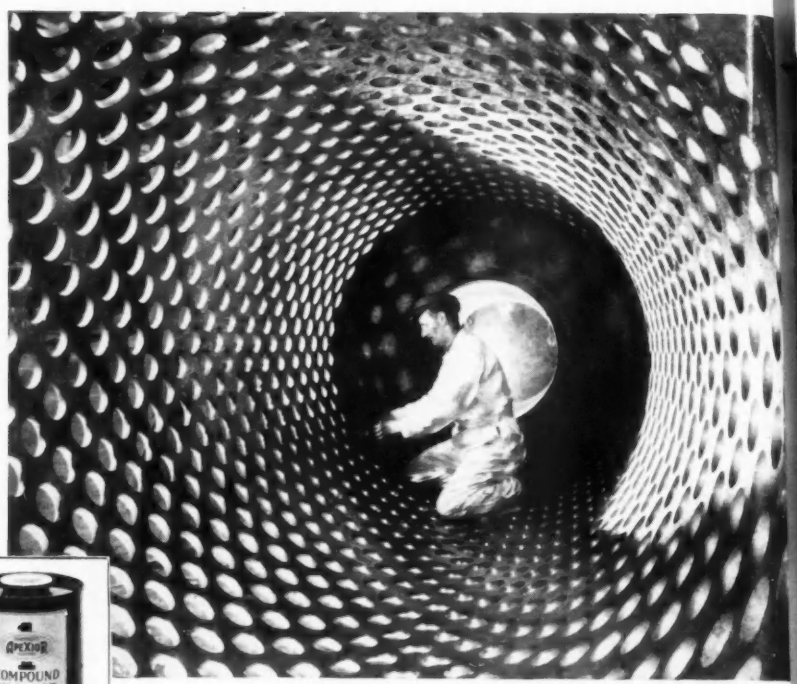

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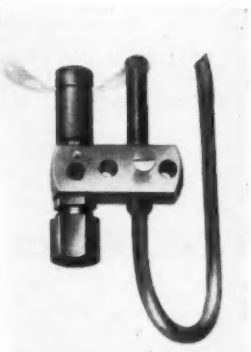

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CONTENTS

EDITORIAL COMMENT

A Solution to the Falling Domestic Load - - 17
South Western Success Story - - - - - - 18

CORRESPONDENCE

'The Architect and the Gas Engineer.' From J. I. Bernard - - - - - - - - - 37

SPECIAL ARTICLES

Terylene Belting - - - - - - - - - 26

97th ANNUAL GENERAL MEETING INSTITUTION OF GAS ENGINEERS

Live Gas. By Stirling Everard - - - - - - 19
More Pictures of the Meeting - - - - - - 25

NEWS SUPPLEMENT

Extension to S.W. Gas Grid Opened - - - 31
London and Southern I.G.E. Visits Dunstable - - 31
Record Size Oxygen Plant - - - - - - 31
W. Midlands New £1 mill. Gas H.Q. - - - 32
Sales Staffs' Three-day Conference - - - - 32
Day Out in Bristol - - - - - - - - 32
Personal - - - - - - - - - 37
Coming Events - - - - - - - - 37

TECHNICAL DEVELOPMENTS - - - 28

GAS IN INDUSTRY SUPPLEMENT

Editorial: Service to Glasgow Industry - - - 181
A Gas Revolution in the Potteries. By Eric Ford - 182
Factory Kitchens—III. By 'GAStronome' - - 189
The Development of the Industrial Gas Load in Scotland. By A. Higgs and R. W. Deans - - 190

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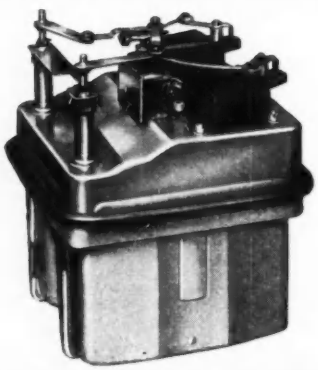

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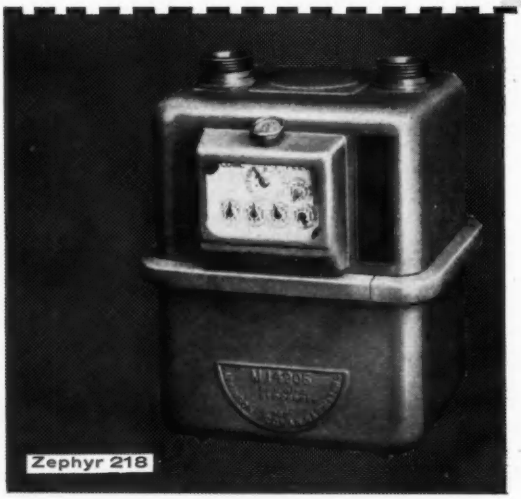

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Gas Journal

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A solution to the falling domestic load

HOW can we restore the domestic consumption of gas to the level it was in 1948? What has caused the heavy fall in the average consumption per household in the last ten years? It is such questions as these which have been repeatedly asked by those responsible in the area boards for maintaining their gas loads. In spite of an increase in the total number of gas consumers and the successful exploitation of industrial gas, the total gas load has obstinately refused to move more than 1% or 2% either way from a stationary figure it achieved a few years ago.

An increase in domestic gas consumption is clearly the aim of each area board since this load is the basic, bread-and-butter load which has sustained the industry throughout its long existence, first as the lighting and then as the cooking load. It is a means of selling 'expensive' gas, but this does not imply that to supply the domestic consumer is necessarily an inexpensive process and that the extra income from such sales is all additional profit. The consumer who has gas laid on as an emergency fuel is hardly a paying proposition, though he may have to pay the top price for the gas he does use. For gas to be supplied to the domestic user without incurring a loss, a minimum annual consumption must be maintained. In the great majority of cases this is greatly exceeded but the ominous fall in this annual consumption figure has caused a good deal of anxiety. What is the reason for this drop in the popularity of gas as a fuel and how can it be explained?

Mr. Stirling Everard, Manager of the Market Survey Section of the North Thames Gas Board, shows in his paper 'Live Gas,' read at the meeting of the Institution at Edinburgh in May, how a survey of the consumers in his Board has revealed certain tendencies. Such information is of the utmost use and greatly assists the selling side of the industry to plan its policy as to what class of consumer to reach and which type of load to encourage by advertising and by the improvement in equipment design.

In the early part of his paper, Mr. Everard analyses the falling consumption under a number of heads and though his survey was necessarily confined to his own Board's area of supply, the points he makes will probably apply with modifications to other heavily populated urban areas.

The survey shows that two main changes have taken place in the last 30 years. The first is the declining importance of the gas cooker in many of the poorer households and the second is the steady easing of conditions of overcrowding caused by inadequate housing which was made worse by the wartime air raids. The latter was bound to ease in time and perhaps the conditions now prevailing might be considered as more normal. While it lasted, however, extra gas rings and minor cooking equipment were installed to enable the separate families living in the one house to be independent for light cooking and water heating.

The falling off in the importance of the gas cooker is, Mr. Everard says, a direct consequence of a desire for more amenities and a higher total income by which members of the family may satisfy those desires. Probably gone for ever are the days when the gas cooker was the chief source of heat in the urban working man's house. No longer will all the water for washing or washing up be heated on it and no longer will the oven door be left open to warm the rest of the house. Other means will be used as the lower income group families are moved to modern housing

The desire of many families to install more attractive equipment, coupled with the area boards' efforts to replace obsolete black cookers, have clearly had an effect on the overall domestic consumption. Thermally more efficient, these new appliances are showing a considerable saving, but they are also being used less since central hot water systems are being installed in new houses. Space heating may be by portable paraffin heater or electric fire in addition to solid fuel, so the old standby, the gas cooker is no longer the sure, steady and reliable load it was.

Mr. Everard compares the relative prices of gas appliances of today with those available between the wars and shows that not only are the relative prices very similar, but the choice of additional equipment as part of a medium priced gas cooker, for instance, is far greater. The cost of appliances should therefore be no obstacle to their being bought. He also stresses that

there is really no evidence to show that the price of gas is a deterrent to its use, though it has to compete with the paraffin heater and the larger types of central heating and hot water installations. Even electricity at 1½d. per unit has no runaway start over gas at the flat rate, so that in the domestic tariffs gas has the advantage once the critical consumption has been passed.

These points we find of the greatest interest, but still we are not completely clear as to the solution of the problem of low consumption. Mr. Everard goes on to point out, however, that the very change that has overtaken the families as they move out into better housing and therefore into conditions of potential demand for better equipment, has also changed their way of life.

The number of working wives has increased enormously in the last 20 years and many of these may be working to avoid boredom in their new surroundings. This means that less food is cooked at home, there is less home laundry and there are few fires burning throughout the day. This may well have had a depressing effect on gas consumption but at the same time, as Mr. Everard points out, it is potentially the most wonderful opportunity for gas. He pictures the working housewife returning home on a wet November evening between 5.30 and 6.0 p.m. Gas will give her immediate hot water for a wash, a quickly boiled kettle for a cup of tea and a warmed room in which to drink it. This can be typical and it will clearly appeal to the young married couple who rightly want the maximum of comfort for the least expenditure of really hard work. The number of working housewives is likely to increase and the area boards have been quick to realise this. The water heating and space heating loads do, we feel, hold out a real solution to stop a further falling off in the domestic load, and the tremendous success of the convector room heater and gas-fired heating sales are ample proof of this. There only remains the refrigerator load, and if this is taken with the cooking load, it might well restore the importance of gas for the preparation and preservation of food.

South Western success story

WE have now had an opportunity of observing the Minister of Power, Mr. Richard Wood, at a number of gas industry functions and have been impressed by his obvious interest in what is going on and by his assertion, made on several occasions, that gas has an extremely important part to play in the fuel future of the country. A Minister of Power who showed a particular sympathy for gas would not be doing his job properly, for impartiality must be the very essence of his behaviour; all we have a right to ask for is a fair hearing and a proper understanding of the special problems besetting the industry today. No one is likely to deny that Mr. Wood is giving us that fair hearing and is anxious to make his understanding of the situation as complete as possible.

Last Friday we saw him perform a double opening ceremony in the South Western area where he opened the handsome new service centre at Exeter and inaugurated the Board's bulk supply to North Devon. The latter marks the completion of the last major extension to the gas grid in the South West. From Exeter new mains now stretch out to bring North Devon into the Board's integrated supply system. This extension means that gas production ceases at Barnstaple, Bideford, Ilfracombe and South Molton.

Engineers overcame many problems in laying the new link, most of which is constructed in 10- or 12-in. diameter pipes. Mainlaying started in October, 1959, and a modified system of pipe-lining was employed for the first time. Maximum use was made of mechanical plant for trench excavation, reinstatement and pipe handling and the pipe was laid at the remarkable average rate of two miles a week despite appalling weather. Of the total of 80 miles of main involved in the project, some 70 miles—or 88%—have been laid in private land, keeping inconvenience to road users to a minimum.

Since nationalisation the Board's policy has been singularly progressive, even drastic, as indeed it had to be with a straggling area served by over a hundred separate works. Today the Chairman, Mr. C. H. Chester, is nearing the realisation of his ambition. By the end of this year he will have only 16 production stations—11 large units and five small units—and by using his exceptionally long grid he can operate the majority of plant on a constant load.

At Exeter Mr. Chester pointed out that the cost of adjusting the existing plant to accommodate oil gasification was only about 10% of what would be required for new traditional coal carbonising plant, and it enabled the Board to increase the daily output of plant by 20%. The magnitude of this comparative capital expenditure was that to increase the daily output of plant by 20% by installing traditional coal carbonising plant would require a capital expenditure in excess of £4 mill., whereas capital required to obtain the same quantity of gas from oil gasification was only about £400,000. And on the subject of capital investment he claimed that his Board was the first in any nationalised industry to be able to announce its ability to be self-supporting for capital monies after this year. With stable gas prices and sulphur-free gas just round the corner he certainly has cause for satisfaction.

It would be unfair not to comment on the splendid new service centre which, when Exeter's rebuilding is complete, will not only enjoy an excellent position in terms of business, but will also provide a commendable architectural contrast with the older buildings, not least of which is the cathedral which complements the showrooms at either end of an attractive new pedestrians-only street. Clearly the South Western Board has not developed its production and distribution functions at the expense of the commercial side, but we would suggest that the acquisition of new major showrooms is not the only answer. The Board has a number of small showrooms which urgently need cheering up; some of them are pretty grim.

LIVE GAS — a review of the domestic market

By STIRLING EVERARD, M.B.E.

IN 1949 the author had the privilege of reading a paper before this Institution in which he dealt with some of the early findings of market research regarding the pattern of demand for gas, and, in the same year, of preparing for the Institution a report on the domestic gas load, which was presented at the fourth conference of the International Gas Union. In these he dealt with the constant factors affecting domestic gas consumption—the size of family, the number of rooms in the dwelling, the appliances in use. The present paper, 11 years later, attempts to deal with the variable—and much more elusive—factor of the background of the home.

It has been clear for some time now that the level of domestic gas consumption is falling, and various reasons have been suggested for this. The first part of the paper, therefore, describes the findings of a series of surveys undertaken by the North Thames Gas Board to establish the causes of this decline; in the second part are reviewed the results of a number of surveys by the North Thames and the South Eastern Gas Boards, which show what can be done to combat it.

The findings of these special estate surveys confirmed everything that had been suspected. The average consumption per gas consumer was in most cases in the 80s, and the consumption per dwelling was, of course, below this, although, generally speaking, all houses were carcassed for gas. It was not, however, the low consumption itself that was important; it was the type of consumer with whom it was associated. People who occupied a £4,000 house, ran a new car, who lived comfortably in every way; who had paid, say, £65 for the gas cooker, with which they were extremely satisfied, were using only 60 or 70 therms per year, and did not want any more.

Wives went to work

The reason was clear enough. Husband at work, children at school, a home in which labour was reduced to a minimum; there was a loneliness in the new estate—a boredom, if you like—that led many wives to work, perhaps in an office, perhaps in a voluntary organisation, sometimes in a shop or factory, whole or part-time, apart altogether from the money.

The reduced gas load was a measure of this, and it was found wherever these conditions exist. It spreads to the older property when this is comparably equipped. There is no cooked breakfast; there is no water heating on the hotplate; for five days a week, there is no mid-day meal; the evening cooking is reduced by pre-cooked foods. This is the way of living of the future.

A gas board does not get much sustenance from 60 therms per year and at first sight these findings brought little comfort. Market research, however, is a reconnaissance to find the strength as well as the weakness of one's situation, and one thing had appeared of very great value—the importance to the customer of speed.

It is not so much the hurried pot of tea or of instant coffee before going out to catch the morning bus that matters. It is the return at 5.30 or 6 o'clock on a wet November evening. Immediate hot water for a wash, although the house has been shut and empty all day; a quickly boiled kettle for tea, and a warmed room in which to drink it. An evening meal with the least possible work, which means as well as a good cooker a refrigerator for frozen food. No grates to do; no scuttle to carry; no ashes; no dust—and all, as quick as gas.

Market information pooled

The North Thames and South Eastern Gas Boards have for a long time pooled information on market research, and this seemed an appropriate occasion to draw examples from both, for the problems of the two boards in this field are very much the same. These results can, therefore, be taken as representative of London and the south east of England.

Although, according to statistics published by the Treasury, 70.5% of all personal incomes in this country are below £700 a year before tax, and 91.6% are below £1,000 a year before tax, this often does not represent the total income of a household. Single-income families are probably the exception; nevertheless, the total expenditure on fuel in the great majority of households remains modest. To halt the fall in domestic gas consumption, therefore, the reversal of the decline in the load of the many small domestic consumers is more important than the achieving of spectacular consumptions from a few large users. The analysis that follows is planned from this aspect.

[*The analysis covers cooker consumption, refrigeration, multi-point water heaters, room heaters, central boilers, warm air heating and minor appliances.*]

In preparing this paper, it has been the intention first to examine critically the present trading position, and then, having seen the terrain on which the battle for tomorrow's business must be fought, to review the principal weapons by which it may be won.

The domestic load per consumer is today gradually declining and it would be unwise to suppose that it will not decline further before the trend is reversed since a lot of additional apparatus has to be sold to counter the natural falling off of demand due to the change in the pattern of domestic life. Exchange business will do nothing to alter this, but, due to improved efficiencies, might have accelerated the fall in consumption.

To put the position in plain terms: A drop in the load

Mr. Everard is the Manager of the North Thames Gas Board's Market Survey Section.

amounting to three therms off the average annual consumption of the domestic consumer—a supposition that is by no means fanciful—would require, to counter it completely, the sale, for every 1,000 consumers, of additional appliances, over and above the present sales, of either 200 gas ignition grates, or 167 gas-electric washing machines, or 120 convector fires in bedrooms, or 100 small refrigerators, or 32 multi-points in bungalows, or 23 convector fires in principal living-rooms, or 10 Halcyon heaters, or 930,000 B.t.u. capacity domestic boilers, or 290,000 B.t.u. capacity domestic boilers, or, of course, any combination of these or other appliances producing a comparable load. Only when additional apparatus beyond this had been installed would the load begin to rise.

Competition from electricity has to be met by the value of gas service. It is not likely to be defeated on price alone, either of the appliances or of gas; and here every effort is required to maintain and exploit the advantage that gas can offer in speed.

Competition from oil is also inevitable, up to the point—and down to the price—at which all surplus fractions are absorbed into the market. Here, again, gas must offer particular advantages, in this case no smell when it is burning and no need for storage.

In the loads discussed, it will have been seen that in almost every example the factor of convenience has been important. It has resulted in loss of load by gas where easier methods are now available—on a large scale by the loss of cooker consumption through the introduction, almost universally, of comprehensive water heating; in detail by the increasing use of such things as toasters and electric blankets. It has resulted in a gain for gas, for example, where the convector fire replaces coal, or the sink water heater supplements a solid-fuel hot water system. It was the appeal of convenience that suggested to the Market Survey Section of the North Thames Gas Board a cooker pivoted on a solid base, so that it could be swung out from the wall for cleaning without impairing its stability—an idea now covered by a provisional patent.

The future of gas in the domestic market lies in the ability to judge the public needs, not as they develop, but in advance, and to be ready to meet them quickly, cheaply, efficiently and, above all, with understanding.

DISCUSSION

Mr. M. Milne-Watson, C.B.E. (Chairman, North Thames Gas Board): I particularly welcome Mr. Everard's admirable paper presented to us today. He draws certain conclusions from his statistical analyses of consumer needs and behaviour, and outlines a clear pattern of selling which we must either turn back with proved facts and arguments or else must take to our hearts and use as the basis of immediate sales planning.

If it is true that you can prove anything with figures, it is equally true that you can prove anything by an unscientific market survey. Another thing of which one must beware is a collection of facts which, because of their fascinating unexpectedness, tend to divert one from the main purpose—namely, to analyse social needs and trends and to slant one's selling accordingly.

Mr. Everard tells us what we all know full well, and that is that the average domestic consumption is falling. He then goes on to analyse this and shows us that the largest single factor in this phenomenon is the employment of married women. He shows us that there is more money coming into the home but that we in the gas industry are not getting our fair share of it, and he analyses the reasons for this. Of course, he is dealing, as a good market surveyor, with the normal year, and rightly ignores the effect of such occurrences as freak temperatures.

In our Board, we have kept temperature records for many decades, and it is interesting that last year, the average temperature was the highest in all our records. In an attempt to analyse the effect of this compared with the known drop in domestic consumptions from other reasons, as detailed in Mr. Everard's paper, we took out the gas consumptions of our own canteens during the summer months of 1959 and found that, in the June, September and December quarters, they were down by 15.6%, 18.3% and 12.5% respectively. What happened in canteens must have been true of every domestic kitchen, and it is therefore small wonder that it was such a disastrous year for so many of us.

Returning to Mr. Everard's paper: I have tried to read it against the background of what one sees going on around one in everday life, and at every point his conclusions fit the pattern. The Englishman's home has traditionally been his castle, and therefore it was perhaps appropriate that, like most real castles, it must be extraordinarily uncomfortable. Now, for the first time, the Englishman's home is becoming a home and as such he and his wife are becoming interested in comfort and even occasionally in beauty.

Thanks to the co-operation of the appliance manufacturers, we in the gas industry are able to help in this transformation, but first, we have got to get rid of the idea that gas, like antique plumbing, belongs to the castle age. Thanks to the advertising of the Gas Council, we have already gone a long way in this direction, but this must be supported even more fully by area boards, so that our salesmen do not meet a basic resistance to their wares. Much as I hate the words, we have got to make the public realise that gas is indeed 'contemporary,' 'streamlined' and 'modern.'

Domestic revolution took place

While Mr. Everard was collecting the data and preparing his paper, a domestic revolution was, in fact, taking place, and it is, therefore, almost as a prophet that he wrote of the immense potentiality of the central heating load. The sale of central heating and hot air installations in the south of England has suddenly reached such amazing proportions that we may be hard put to it to cope with the demand.

It is, however, just one of the glorious opportunities that he emphasises, namely, that the domestic load, having receded for a time, will, provided we seize our opportunity, increase again perhaps to almost undreamed-of heights.

Mr. M. R. Bone (South Eastern Gas Board): In the middle of [p. 12], Mr. Everard says 'the reversal of the decline in the load of the many small domestic consumers is more important than the achieving of spectacular consumptions from a few large users.' If we regard small domestic consumers as those who only use one gas appliance, then approximately a quarter of the consumers in our area come within this category and the single appliance is nearly always a cooker. I would not pretend to know whether this figure applies throughout Britain, but whatever it may be for each particular area, it will define the size of the most important sector of the domestic market. This is the first step to selective selling.

In the middle of [p. 18], he says that 'the objective should be to see that at least two of the four (major gas appliances) are to be found in every home.' It is an easy

matter to state in simple terms this vital need to sell a second appliance to those who only use one at present, but rather more difficult to suggest the answer in a nutshell. The opportunities in the domestic space heating market are already well known and the paper gives an indication of the additional loads which might be expected following the installation of these appliances. Our own survey carried out in 1959 and covering 2,600 households confirmed that cooker-only households use solid fuels for space heating every bit as often as other gas consumers. Hence there would appear to be no special obstacles in the path of progress in that particular market by persuading people to use gas instead of solid fuel.

Perhaps we are not so fully aware of the prospects in the other major markets where the potential load is smaller but still very well worth having. This may arise because we see at irregular intervals the reports of surveys made by our own boards, by the electricity supply industry, and by other sources both inside and outside the fuel industries. We read them and possibly remember one or two figures such as the proportion of households having a certain gas or electric appliance in which we happen to be specially interested at that moment.

What we rarely see is an assessment of the extent to which households are equipped to fulfil specific functions such as home laundry, water heating and refrigeration. By deduction, we can then know how many households are not properly equipped to do these everyday tasks. Our survey showed that, about a year ago, in south-east England, 22% of the homes had no water-heating appliance, 45% had no laundry appliance, and 75% were without a refrigerator. We do not have to persuade these people that our fuel can do the job more efficiently than the one which they already use. Our task is to sell them the idea that their homes would be better places if at least one of these additional services were provided.

We can no doubt think of many reasons for the existence of so much virgin ground which still remains to be developed. Some people, because of their mode of living, would not be able to use the appliance sufficiently to justify buying one. Others may be anxious to have one and yet be unable to afford it, though Mr. Everard has emphasised that the proportion of households where this may be true has dwindled in the post-war years.

Barrier in our own minds

There is little doubt that a substantial percentage of the one gas appliance households could afford a second piece of gas equipment. Is it just possible that one of the reasons for their not buying it is the barrier which we have erected in our own minds? If the figures which I have given achieve nothing else, I hope they may encourage us to think that any such barrier is not insuperable, and that if we succeed in breaking it down, the consequences, through increased sales, might even give us a very pleasant surprise.

Mr. E. Crowther (Chairman, Northern Gas Board): This is by no means the first time that Mr. Everard has put us in his debt in offering to the industry a careful and objective analysis of the underlying causes of current trends, on this occasion trends which are diminishing the quantity of gas sold to the average domestic consumer. The merits of such analyses are that 'hunches' based on scanty or haphazard evidence are corrected, or perhaps confirmed, but more important, are quantified, giving a reliable basis for future action. Mr. Everard is eminently qualified to provide such analyses because of his single-minded determination to accept no preconceived opinions without proof amply supported by the patient collecting and sifting of evidence. This is clear not only from the present paper before us but from his earlier papers on similar and allied subjects.

Many of us will remember his earlier aphorism that the quickest way to lose the cooking load is to have no other appliance than the cooker in the house. Now he warns us that, even if we retain the cooking load, it is questionable whether we shall pay our way unless we attract other and additional domestic load.

It would be interesting, and perhaps possible, to obtain some information as to the trend of the individual domestic cooking load per consumer where an electric cooker is in use. If the same trend is observed there, it would amply support, if any support is necessary, his view as to the underlying causes of the decline.

On this occasion, he has concentrated rather on the decline in consumption per consumer than on the movement in the gross and net numbers of domestic gas consumers and on the total sale of domestic gas. It is perhaps to be expected that, gas having been first in the field, with a one-time figure approaching 100% of the domestic cooking load, some erosion of the figure was bound to occur as competition developed, but it is reassuring to learn that the popular sentiment is no less favourable towards gas than hitherto, or is becoming more favourable among the most recent generation of householders.

Another communication welcome

Nonetheless, I personally, and I think many of us, would welcome another communication from his pen, dealing with the movement in numbers of domestic gas consumers, and the trends which influence the householder either to use or to decline to use gas.

Having given us the facts and his conclusions, he offers several pointers towards our future action. Two points which emerged from his paper struck me particularly. First, his reference to the desirability of selling the idea rather than the apparatus. I refer to his remark on the report of the London Press Exchange concerning water heaters; and the other, in his paragraph headed 'the opportunity' where he refers to the importance of quick service on the return home on a wet November evening.

On the sale of the idea, I think you will find it very significant that recent massive publicity for central heating, issued by the oil and coal interests, has attracted no small volume of central heating to ourselves; the idea having been sold, the agent by which the idea is brought into being is another matter, and all publicity towards central heating, whether it be ours or others' tends to our advantage.

On the second point, the return home on a wet November evening, I begin to think we should do very well to re-examine some of our publicity. Pictures of a leisured family, complete with cat, seated before a glowing fire as though they had been there all day and hadn't a care in the world must leave the returning housewife quite unimpressed and, indeed, mildly exasperated. Can we change the pictures altogether to an impression of the dreary house transformed in a matter of minutes through the agency of gas, because if so, we are going to strike a chord where we may find a response.

If we use the survey in the manner intended, forming our future policy upon the information which Mr. Everard has assembled and analysed, this may prove one of the most rewarding studies undertaken on behalf of the gas industry for a number of years.

Mr. E. J. Kenward (Market Survey Section, North Thames Gas Board): Market research is not only useful in defining the commercial problem, it can also offer much information which will help in advertising and display, in briefing salesmen, and in the development of appliances. In this connection the discussions between Watson House

and the North Thames Gas Board market survey section have been particularly valuable.

In addition to the knowledge of the usage and characteristics of appliances, it is absolutely essential to seek information about our customers—and for that matter, about people who are not our customers—so that we can assess their opinions and needs. The practical use of appliances and the actual behaviour of customers are the vital factors in the business of selling gas.

You will have noticed, for example, that the youngest group of housewives is now much more inclined to be gas-minded as compared with the immediate post-war generation. The promise here is perhaps not so much in immediate increased business, but in an indication of opportunities which will arise when these families acquire the income, and the inclination, to enjoy higher standards of home comfort. Precisely this group of housewives comprises the largest group of prospective refrigerator buyers and a series of reports were compiled by the market survey section to explain the various features of refrigerator design which make a particularly strong appeal.

Best prospects for room heaters

Room heaters show the best prospects in a different market, since here, more than half the business lies with housewives between the ages of 41 and 60, who are living in houses built between the wars. It is important also to appreciate that a quite remarkably high proportion of buyers are housewives who are in full-time employment. Of all the reasons for buying our room heaters, much the most important were convenience and labour saving. The lady who kept her room heater solely because of its beneficial effect on her husband's lumbago was admittedly exceptional. One important fact was shown—that nearly half of these customers with room heaters who were on flat rate charge for gas could have benefited by transfer-to the two-part tariff. They were perfectly content with their gas equipment, even when paying more than they need for the fuel.

In order to define the target more clearly, some extra work has been undertaken, particularly in the newer and developing fields such as space-heating. Thus we know, in respect of many markets, the magazines and newspapers read by a particular type of customer, the size and type of house and of family, the customer's opinion of various aspects of gas service, the husband's occupation, and some ideas concerning the priorities which they have in mind in the way of domestic equipment.

It is particularly important that commercial policies should be readily altered to meet the constant change in customers' needs, and for this reason, market surveys must be constantly revised and renewed with fresh information. Two examples from fairly recent surveys are well appreciated: One revealed that only a few years ago, the making of ice cream was a good refrigerator selling point, whereas now, not one housewife in 20 is interested. Another example comes from a survey of new housing and shows that a growing proportion of housewives are resentful of the job of cleaning out the grates of solid fuel boilers. There is an inclination and intention to change from solid fuel in smaller and low-price properties. The precise evaluation of this intention will determine the balance of the market between gas and coke prospects.

Market research offers at the very least an objective test of the policies pursued in the commercial field. Beyond this, there is a wide field of application in assessing new markets and the appropriate publicity and selling methods which are needed to meet each new situation, above all in the ever-changing—and this is the important word, 'ever-changing'—economic and social circumstances of today.

Mr. G. E. Thomas (Area Industrial Gas Engineer, Eastern Gas Board): Market research can be likened to crystal gazing but what is apparent to the gazer is not always apparent to others. Having been engaged for a number of years as an industrial engineer and on the fringe of the domestic market, I would hesitate to cross swords with such a redoubtable exponent of his art, but there are one or two points on which I would like to comment.

The priorities associated with the spending habits of the British public are pretty obvious: Entertainment, luxury, the removal of drudgery, and attraction to gadgetry and other conveniences, and labour-saving devices, probably in that order. Yet, strangely enough, luxury and snob appeal, while apparently ignoring the high level of prime costs in pride of possession, is, in some cases, not strong enough when called upon to meet attendant utility costs.

That is one reason why I disagree with the author's comment that gas prices have not proved a deterrent to its greater use in the home, although I do concede that he has qualified that statement with regard to large scale heating and hot water. But I still think it equally applies to local heating and local hot water, and the image which has been growing up with the public for some time, rightly or wrongly, is that for these services, gas is expensive. I say this despite the attractive tariff structures which have come into effect over the last few years and also the moderate success which has been achieved by many area boards in the development of central heating. It hits the pocket too hard for what many—far too many—of the British public still consider as not so essential services. The public, in my view, is still in need of a great deal of education and persuasion, and I think also a great deal of education is needed on the utilisation side of the industry in the selection and recommendation of the right type of appliance for the right type of job.

All forms of space and water heating appliances, central or local, must provide the customer not only with pride of ownership but also with all the factors of convenience, adaptability, automaticity, associated with our main competitor. We shall not meet these requirements until all appliances are installed with reliable ignition—devices and, in new property, be independent of the need for internal flues.

How representative are the figures?

Referring to [Table 6 on p. 16], how representative of acceptable standards are these figures? When stationed in the Watford Division of my Board, I kept a close watch on the results obtained from several hundred domestic gas-fired boiler installations, classified according to duty and output, identical with those quoted. Despite full automation, our average consumptions were way above those shown in [Table 6] and were respectively, as you read down the column, 623 therms per annum as compared with 346, 1,094, 1,234, and 1,972. These are sufficiently above the figures quoted by the author to warrant some consideration as to which are accurate representations of the conditions of this class of load, though it is true to say that the great proportion of these boiler installations were installed among higher income group and in property valued at £5,000 and upwards. Has the author any information on this aspect in connection with the figures he has quoted. If you look a little more closely at these figures when they are related to the maximum outputs of the boilers, you will find that these work out at something like an average use of 17 hours maximum rate per week for the smaller size, going up to 27 hours for the larger size.

The bulk of this market seems to lie in the classification 2 and 3 of the boiler outputs but, even so, that market is a very limited one. But it could be extended very considerably, as the author has pointed out on [p. 17], when he shows the high proportion of boilers purely associated with hot water services which are approximately four or five times that of the heating service. The value of this is in the load which is obtained from the domestic heating water boiler as opposed to the heating boiler; the smaller the output, the smaller the load, but the more evenly it is spread over the four quarters of the year. I feel that here is a market that we should be attracting. Some indication of this is given if I quote respective March quarter consumptions for the four categories. For the smaller boiler, the March consumption amounted to 29.3%, the next size 31.7%, the next, 33.8% and the largest size 36.2%, which gives a clear indication of the value of the hot water load.

Finally, in view of the considerable amount of work which has been carried out by Watson House on ancillaries particularly with regard to development in residential property, is there any significance in the author's omission of any reference to this possible new load?

Mr. J. Castle (General Manager, Mersey Group, North Western Gas Board): In his concluding remarks, the author says the future of gas in the domestic market lies in the ability to judge the public needs, not as they develop, but in advance, and to be ready to meet them quickly, cheaply, efficiently and, above all, with understanding.

He points out that the domestic load per customer is gradually declining and that it is likely to go on declining largely arising out of a change in the pattern of domestic life, and he draws particular attention to the importance of working wives.

I want to emphasise the importance of this factor which was a subject which I touched upon at the Institution meeting last year. It is working wives who, by going out to work and thereby changing the pattern of domestic life, are responsible at the present moment for a reduction in the demand for gas from the usual appliances installed in their homes, and it is they who may be influenced to use far larger quantities of gas in the future.

I agree with the author when he infers that the domestic load per customer will tend to go on declining and this, it should be noted, will take place if the strength and nature of our selling effort and the appliances upon which we have hitherto concentrated is of the same order as it has been these past few years. Indeed, the picture may be a little worse than he portrays, because, on the introduction of two-part tariffs, often associated with high-priced gas in the first stages of alternative block rates, there is a tendency for the number of customers to decline before extra load develops from those taking advantage of two-part tariffs.

Can we afford to lose load ?

Those who are ceasing to use gas are referred to these days as uneconomic customers. Just how uneconomic can an existing customer become? What alternative use is there for the service pipe, gas main, manufacturing plant, booster, and the like which have already been provided for such customers? Can we really afford to lose the load of any customer who currently uses more than 10 therms per annum?

To meet this decline, we have to sell appliances which will use additional gas, and, as the table provided by the author towards the end of his paper shows, the most potent appliances which we can sell are those concerned with space-heating and, it should be noted, it is far more likely that space-heating appliances will be responsible for additional load than, for instance, gas/electric washing machines. Indeed, I would exclude the latter entirely from consideration as being likely to lose load rather than gain it.

However, to return to my major point, today women represent a large proportion of people gainfully employed, and it is reasonable to suppose that this proportion will not decline—but in one important respect it is changing. In a few years' time, there will be more men than women of marriageable age, so that, in future, no girl need remain a spinster unless she wishes it. The fact is that, quite apart from the author's inference that more married women will tend to go out to do some form of work, out of boredom or some such reason, a greater proportion of women at work will be married. This change is already well under way and the proportion has yet to increase quite considerably.

These women will insist upon all modern aids in the kitchen and, in my view, above all else, they will insist upon some quick, clean and efficient means of heating their homes, preferably automatically, so that the house is warm when the family returns from work.

Gas is pre-eminently suited to this task and with it, the providing of hot water. With the advent of two-part tariffs throughout the country, it can now compete favourably not only with its rivals but even with solid fuel itself. Oil, electricity and coal are after this very business, but it is we who have the best service to offer, although hitherto we seem to have taken few enough steps to make this clear not only to prospective clients but to local authorities, architects and builders.

Essential to prove case for gas

It is essential to prove this case for gas, in practice, as widely and as quickly as possible. The building of multi-storey flats lends itself admirably to this end since, in general, solid fuels are excluded. It is here that we must apply the greatest effort to ensure that gas is installed for space and water heating so that our arguments may be substantiated to a large number of ordinary people, who may help in persuading those living in more orthodox dwellings to become interested in these same facilities in their own homes. Then, by installation and the use of suitable equipment, all the money that has been spent on servicing new houses since the war may at last be justified.

It is not only a question of knowing what business to go after, but of knowing how to go about getting that business, and here too I feel that changes are necessary. Our contact with architects, builders and with local authorities leaves a great deal to be desired. In different parts of the country, different methods have to be adopted, so I will indicate how this is being tackled in the Mersey Group, upon the formation of which the commercial approach of the former Liverpool and Wirral Groups was reorganised. There are now three first class men representing the Group at the highest level, having the backing of a technical advisory service comparable to that provided for the industrial sales staff. Although the new arrangements have only been in vogue for six months, it is interesting to see what the effect has been.

It so happens that, owing to a shortage of building space, some of the larger local authorities served by the Group embarked some time ago upon the building of flats, and the City of Liverpool, for instance, has published a scheme to re-house an entire district in multi-storey flats at a cost of some £19 mill. With one exception, where solid fuel has been excluded, all the multi-storey flats recently built have been heated by electric under-floor heating, and the chances for gas seemed very dim indeed. This is in the Group as a whole, not merely Liverpool.

As a result of sheer hard work and the full-time service of the senior men—by the way, they carry no title whatsoever—who have a wide freedom of action with facilities to demand service from the Group and to commit it to provide service as they think fit, we have now received orders or promises to install gas for space-heating by a current of warm air, water heating and, in some cases, incineration, in one 11-storey block, three 14-storey blocks, one 15-storey block, one 17-storey block, and five 4-storey blocks, together with some 900 houses at present building throughout the Group.

I was interested to hear a former speaker refer to incineration because it is in the 17-storey luxury flats that we have been asked to provide incineration. All these customers will have an average load of some 500 therms per annum, and the distribution charges on the gas supplied to them will fall from the present catastrophic level of 7d. a therm to new customers to something between 1d. and 2d. per therm.

At the present moment, we are meeting with the greatest difficulty in persuading architects and builders of orthodox property to install warm air equipment—I say this even though we have got 900 houses on the list—but once we get a substantial body of people in favour of gas for space-heating and water heating in the blocks of flats to which I have referred, we shall make a good deal of progress.

I want to draw attention to another fault in our approach to potential customers, namely, the idea that people will want to go on doing business with us because of the excellence of our service in the past. Nothing could be further removed from reality. You have probably all heard the phrase 'the public doesn't owe us a living' but I do not think many people realise what this can mean in practice.

Mr. W. G. Phillips (Commercal Manager, Eastern Gas Board). In the introduction, the author refers to the remoteness between boards and the customers, and the lack of means of being kept informed of their requirements. This is all so true and makes it all the more difficult to understand the attitude found among so many people in our industry that we, with the appliance manufacturers, know all the answers and have no need of market research. Some of the delegates at this meeting also attended the Gas Council Conference at Harrogate last year and heard Dr. Mark Abrams make reference in his address to the apparent lack of interest that the gas industry had in market research. I hope a copy of this paper will get into his hands.

Most comprehensive statement

The paper is divided into two parts 'analysis of falling consumption' and 'future loads.' The 'analysis of falling consumption' is the most comprehensive statement on this vital factor that I have seen. Today, it is particularly opportune to read that, except for certain obvious loads, the price of gas domestically is no deterrent and reliability and service are of great concern. I have held this view for some time, and I would ask the author whether there is not yet another factor of importance—this rather overworked phrase 'the public image of gas.' Has it been found in the surveys that there is an adverse image which is acting as a deterrent?

The paper goes on to show that appliance prices adjusted to 1938 values are as good or better than pre-war; that there is money to be spent by the public; that the market is wide open, but gas has not so far stirred the public imagination. Why not? What reasons do the surveys show for this state of affairs?

The new housing figures show that 33% of all dwellings use multi-point heaters; in 95 small dwellings, 58% or 60% installed multipoints for various purposes, but on the other hand there is a sample of 33 houses fitted with warm air heaters and only 12% with multipoints. Our experience shows that, generally, warm air heaters and multipoints go in together. Were there any special reasons for the low ratio in this instance?

While 93% cookers and 33% multipoints in new housing are certainly a very fine achievement, bearing in mind the author's appliance objective, do the surveys point to any development such as, for example, combined gas and solid fuel grate with back boiler which would give an even higher percentage of partial or all the year round gas water heating.

The North Thames Gas Board's refrigerator survey confirms the surveys of other bodies that refrigerators may take the next priority after television; 23% of householders in this survey already had a refrigerator. The majority were electric. What were the reasons for the majority choice of electricity? It would be of some significance in planning future campaigns.

Developments not fully dealt with

While the paper deals at some length with future loads, it does not deal so fully with new developments as distinct from future loads. Reverting to the 'public image of gas,' one of the ways to affect this in our favour is to sell more prestige appliances: The more expensive cooker, fitted with every conceivable type of gadget, the combined washing machine and spin dryer, the large refrigerator, etc. In discussing this sort of idea with manufacturers, we always come up against the question of what is the extent of the potential market, and can it justify the capital for tooling up and so on. Has the author's market research section any information on this sort of problem?

Market research in other commercial organisations carry out extensive investigations into what the customer's future requirements are likely to be. Has the author's section carried out research into completely new loads such as the domestic drying market? What is the potential for the natural convector box type dryer? What is the potential for the domestic incinerator? What is the market likely to be for the 'exploded cooker' in the next five years?

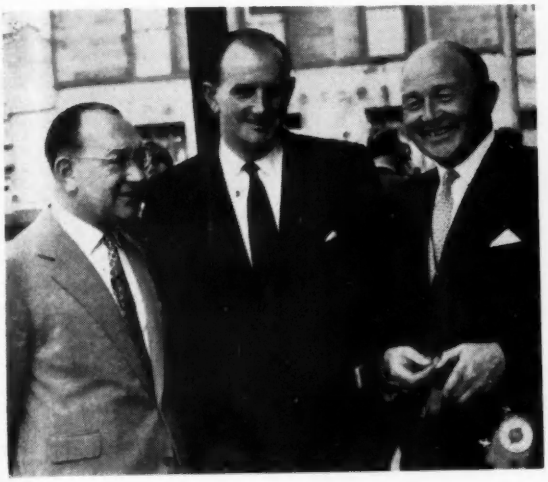
The reference to convenience and the swinging cooker is interesting. In the last few months, I have had suggestions from several different sources that one of the reasons for the popularity of the electric refrigerator is because it is on a flex and we ought to put our refrigerators on flexible tube connections. Has the author met this point in the course of his work?

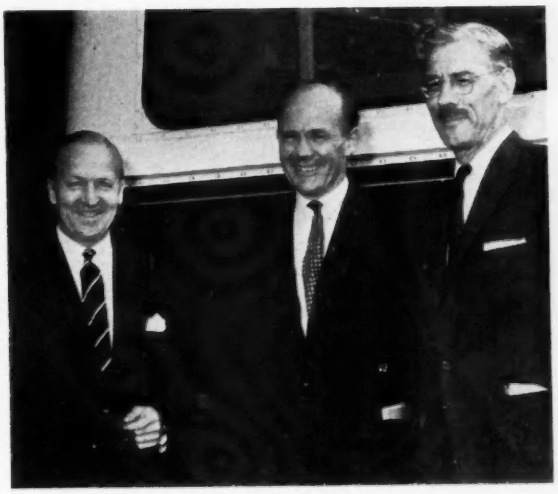
Mr. L. W. Andrew (Watson House): I would like to express my gratitude and compliments to Mr. Everard, not only for the paper but for all the help he has given us over many years. It is true to say that the Gas Council research and development programme owes a lot in its planning to Mr. Everard and his boys, and we can judge the extent to which the work has been successful.

Secondly, I would like to endorse the remarks made by Mr. Thomas. Thirdly, I feel that there is an urgent need for continuing to the maximum extent a consumer satisfaction survey. With space-heating, we have not only got to collect a lot more factual information of actual running costs but we must correlate them with the satisfaction of the user.

Mr. Everard, in reply: First of all I must thank everybody who has spoken so far for giving us at least two years' work in preparing the answers to the very many points that have been raised. I think we have, in fact, got an answer to all of the points and a great many of them would be much better replied to in writing than at the present moment.

MORE EDINBURGH A.G.M. PHOTOGRAPHS





LEFT TOP

From left: Mr. W. Elkerton, Southern Gas Board, Mr. E. G. Smith, Scottish Gas Board, Glasgow, and Mr. J. L. Anstey, Parkinson Cowan.

LEFT CENTRE

From left: Mr. G. V. C. Davies, Humphreys & Glasgow Ltd., and Dr. F. J. Dent, Director of the Gas Council Research Station, Solihull, West Midlands Gas Board.

LEFT BOTTOM

From left: Mr. E. Aspinall, Robert Dempster and Mr. G. J. B. Cox, Scottish Gas Board, Edinburgh.

ABOVE

From left: Mr. F. C. Tatham, Mr. H. D. A. Yates and Mr. F. C. Pybus of Humphreys & Glasgow.

BELOW

From left: Mr. J. A. Hepworth and Mr. H. W. Moys, North Thames Gas Board and Mr. H. M. Lawrence, Southern Gas Board.

A Turner Terylene-reinforced conveyor belt at Wandsworth gasworks.

Terylene belting

CONVEYOR belts and V-belts are subjected to a great deal of hard wear in normal use, and much research has been directed towards improving their wearing characteristics and lengthening their life. The ideal material from which to make these belts must not only be very strong; it must be able to undergo continual flexing without weakening; it must have a very low stretch to prevent the belt lengthening and slipping; and, in the case of conveyor belts, it may have to withstand both abrasion and chemical attack without deteriorating.

A material which offers great scope for duck weavers, belt manufacturers and conveying engineers is Terylene, the polyester fibre manufactured by Imperial Chemical Industries Ltd., and of all the outlets now being developed for this fibre one of the most promising is that of belting. Terylene duck is claimed to be approximately three times as strong as equivalent weight cotton duck, and about twice as strong as Tenasco rayon. It loses no strength on wetting, which is often an important feature when the rubber or p.v.c. cover has started to wear, and it has good resistance to dry heat. After 300 hours at 150°C., most fibres are completely degraded, whereas Terylene as used in belting still retains over half of its strength after 30 weeks (5,040 hours). It is resistant to rot and is unaffected by mildew, etc., because it absorbs virtually no moisture (.4% moisture regain).

Good edge abrasion resistance is a useful feature in many types of conveyor belting, and Terylene is said to have better resistance than the natural fibres used in belting. It is also highly resistant to chemical attack, *e.g.*, acids, oxidising agents and bleaching agents.

Stretching under load may cause slippage in V-belts and transmission belts. With conveyor belting, it can result in continual adjustments to take-up mechanisms, or the extra re-splicing or re-fastening of belts. Although Terylene has sufficient 'give' to absorb reasonable shock loads, it does not have any undue extensibility.

The synthetics, such as Terylene and nylon, are more expensive than most other types of fibres because the raw materials are not cheap to produce, and because the actual production of the yarn requires complex and specially designed plant. In considering price per lb. tensile strength, however, Terylene is in about the same price bracket as cotton. Utilising the strength premium of Terylene, the manufacturers claim it is possible, by judicious blending with cotton or other fibres, to produce a belt in the same

price bracket as cotton but which is nevertheless stronger.

In common with all other synthetic fibres, a bonding agent is used to obtain adhesion between Terylene and rubber or p.v.c., and the recomended processes can give adhesion well over Grade A standards. This bonding is achieved by processes based on isocyanates and very good results have been obtained in this way, particularly with rubber where adhesion has been as high as 40 lb. per 1-in. strip. The use of a cotton weft with Terylene warp has given satisfactory adhesion without the need for any bonding agent.

In some of the belts produced to date, much the same weight of Terylene has been used as cotton fabric in the belt it replaced. This has naturally resulted in a much stronger belt which is, however, appreciably more expensive—one heavy duty Terylene conveyor belt, 6 ft. wide, recently installed cost nearly £16 per foot length. I.C.I. claim that such a belt is three times as strong as the cotton equivalent, has much greater resistance to tearing down its length, has better edge abrasion resistance and is completely rot proof. In addition, it has the same bulk and rigidity which is often desirable where heavy loading is involved if undue troughing and spillage between idlers is to be avoided. A thinner and more flexible belt is, however, often welcome, particularly in applications where greater strength cannot be obtained with the natural fibres except by increasing the number of plies which may give *too* rigid a belt and insufficient troughing. In these instances, a smaller amount of fabric can be used, thereby keeping the price to the minimum, increasing the flex life of the belt, and reducing power consumption. There is undoubtedly a minimum to which one can go before difficulties may be experienced, particularly with such things as fastener holding. This is generally believed to be three ply.

The present and potential uses for Terylene conveyor belting spring largely from the fibre's particular properties. These fall into a number of groups and it depends upon local circumstances of load, etc., as to whether a thinner belt or one of equal thickness to the standard belt is used.

Excellent resistance to heat

Heat resistance. Terylene combines high strength with excellent resistance to heat and flexing. This makes it of particular interest for heat resistant belting for carrying coke ash and other hot materials. Terylene belting was recently installed at a works in Derbyshire, where the existing belting, operating at a temperature of 100°C., was breaking down due to degradation of the fabric reinforcement. In this instance it was possible to reduce the number of plies by 33% and the total fabric weight by 47%. This reduction in thickness resulted in a belt with increased flex resistance. The manufacturer, commenting on trials carried out on their test rig, reported, 'the belt has already stood 500,000 flexings without breakdown. This is a very high figure for four-ply conveyor and elevator belts which usually only give about 75,000 flexings on this particular test before ply separation occurs,' Uncoated Terylene belting is also in use for conveying materials through hot drying ovens.

Chemical resistance. Terylene has great resistance to acids and flexing, and in consequence it is solving a number of problems where trouble was being experienced due to attack on the fabric reinforcement by the material being conveyed. This can occur through holes caused by fasteners, through faults in the rubber or when the cover becomes damaged. One such instance occurred in a Durham chemical factory where rubber/cotton conveyor belting was lasting only ten weeks due to chemical attack of the fabric reinforcement. Five times the life was achieved by using Terylene, resulting in considerable economies, and this belting has now been specified as standard by that plant. Other Terylene belts are in use in a potassium nitrate plant, in a factory making phosphate fertilisers, for carrying beta salt and for other materials.

Rot resistance. A limestone quarry in North Wales has had Terylene conveyor belting in use for over two and a half years with excellent results. The life of the belting previously used barely exceeded 12 months.

The much longer life of the Terylene belting offset the higher initial cost after about 18 months' use; it carried 1.09 mill. tons compared with 320,000 tons for the previous belting. Further Terylene belting has been ordered by this quarry and it is now intended to use it as standard.

Strength. The use of a super tensile belting duck based on Terylene opens up considerable possibilities for making stronger belting that might first permit longer hauls, with a reduction in transfer points and the number of driving heads, or secondly, could facilitate inclined conveying without the need for very thick belting.

Terylene conveyor belting is now being made by a number of the leading belt manufacturers in this country and it is clear from a consideration of the above properties and examples that there are great possibilities for it in the mines, in heavy duty work out of doors, and for specialised heat and chemical resistant uses in industry. Price need not be a deterrant, since blends of Terylene and natural fibres are available which permit the manufacture of belting cheaper than if wholly based on natural fibres, still possessing a proportion of the premium qualities of Terylene.

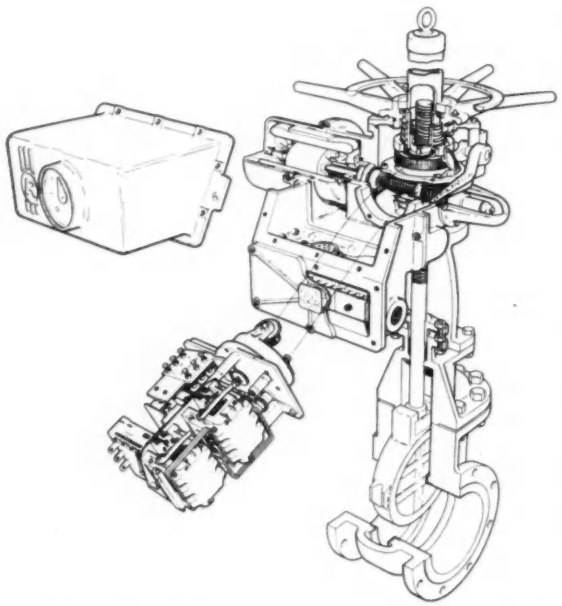
A 36-in. wide Terylene belt at the Bradford Road gasworks, Manchester. It carries 150 tons of retort coke per hour. The belt speed is 250 ft. per minute and the coke temperature is 190°F.

Technical developments

Valve control actuators

ROTORK electric actuators for pipeline valves are an outstanding British development in the field of automatic control. Of advanced design, performance and appearance, the fully flame-proof actuators are now used by the major oil companies throughout the world, while the weatherproof version finds increasing application in power stations, waterworks, chemical, steel and other industries.

For valve assemblies made in sizes varying from a 1¾-in. spindle acceptance diameter to a 4-in. diameter, Rotork performance data show a torque rating from 75 ft.lb. to 8,000 ft.lb. and a maximum thrust from 12,000 lb. to 300,000 lb. Fully controllable from a central desk, the valve motors can be connected by two-wire conductors for remote operation. Easily converted to manual control by raising a lever beneath the operating wheel, the valve immediately reverts to automatic remote control on re-energising the valve motor, so there is no need to manually reset it in an emergency. The presence of any obstruction in the valve bore causing the valve motor to stop, results in the motor being reversed and the valve being fully opened.—*Rotork Engineering Co. Ltd.*



Exploded diagram showing a Rotork electric pipeline valve actuator.

Temperature measurement

THE Kent Multelec temperature instruments employing the null-point method of measurement and mechanical in operation, show whether deviations caused by hand adjustment are within prescribed limits. When employed as automatic controllers they ensure optimum heat input.

The general features of these instruments are frequent automatic current standardisation (potentiometers) in all self-balancing models, the maximum-visibility scale (in self-balancing instruments) is 10 in. (254 mm.) long, with optional concealed illumination, the mechanism is built on to a hinged frame which swings away from the case and provides adequate access to all parts, the case adaptable for wall or panel fixing, and automatic cold-junction temperature compensation.

The self-balancing instruments can be supplied as a single-point indicator, a multi-point indicator or as an indicator-recorder.

Automatic control may be electrically operated as in the Multelec Mark 2 indicator-recorder or by a single point instrument pneumatically operated. The versatility of the Multelec Mark 2 indicator-recorder, in measuring any variable which can be expressed in electrical terms, enables models to be made available which provide an additional reading of oxygen percentage or carbon-dioxide percentage of gases. The Multelec then operates in conjunction with the appropriate gas-analysis equipment; it is, in effect, a two-point instrument, the two circuits being switched in alternately and an indication and record being provided in two distinct zones. Of particular use to the boiler-house operator in enabling him to make a continuous assessment of stack losses, the combined instruments and associated primary elements are fully described in separate literature. —*George Kent, Ltd.*

Coal tar/epoxy coating

A REVOLUTIONARY new protective coating Tretol Coal Tar/Epoxy 177 has recently been developed by Tretol Ltd., which in two coats attains a remarkable film thickness of .02 in., equivalent to some 15 to 20 coats of normal paint, but at a fraction of the cost. It has outstanding resistance to all forms of attack by acids, alkalis, sea-water, oil, sewage and brine to an extent not previously possible by brushed application. Excellent adhesion is obtained without priming on metals and concrete. Designed to preserve plant, pipework, tanks, coke-oven equipment, dock and harbour installations, etc., from chemical attack under the severest conditions, Coal Tar/Epoxy 177 is now offering invaluable help to the corrosion and maintenance engineer.—*Tretol Ltd.*

Emergency trip wire

THE Huwood emergency trip wire provides a safe and effective means of immediately stopping a belt conveyor, haulage or similar transport system in the case of emergency. The operative part of this system consists of a single concentric pull wire running along the whole length of the conveyor or haulage so that protection is afforded at every point. The electric current employed is of low voltage (15 volts).

The circuit is intrinsically safe, and in the unlikely event that a fault should develop in the safety system itself, the conveyor or haulage would automatically be stopped immediately. When a conveyor has been stopped by pulling the trip wire, it cannot be restarted until the lock-out has been reset by an authorised official.

The trip wire need not necessarily be in one straight line, but can be turned readily through any angle. The operation of the Huwood system requires only a moderate pull on the wire, a deflection of less than 6-in. being sufficient. This is simply achieved by the insertion of Huwood clean-break switches at suitable intervals to connect adjacent lengths of trip wire together.—*Hugh Wood & Company, Ltd.*

Bellows expansion joints

OTHER than in instrument work, stainless steel steel expansion joints are the most usual application for bellows. Teddington bellows expansion joints are fitted in pipelines and ducts to take up thermal expansion, to absorb vibration, to allow mechanical displacement without leakage; in fact, anywhere where a temperature, pressure and corrosion resistant flexible pipe connection is required. They are mostly made from 18/8 stainless steel, but special units are made in Monel, Inconel, the Nimonic series of alloys, Nilo K, titanium and other materials possessing desirable properties for particular applications. In this class of material there is no upper limit to the size which can be made. Bellows units can be supplied ranging from 1 in. diameter to 10 ft. diameter, and rectangular expansion joints and 'U' span assemblies can be as large as required.

The condition of the metal, whether cold worked, annealed, or specially heat treated, has a great bearing on the life of the bellows. Cold working the material has the effect of increasing its resistance to repeated stress. Teddington bellows are usually supplied in the cold worked condition, but they can be heat treated or annealed where this is desirable. Bellows are tested to destruction on a machine which continuously repeats a controlled set of movements, with or without internal pressure applied, so as to determine the fatigue life. Hydraulic tests determine the deformation and bursting pressures. Resonance search tests are made on vibration equipment. Metallurgical and microscopic analyses are made before and after the metal is worked. Different methods of manufacture are used. Some bellows are formed from seamless drawn tubes, while the larger stainless steel bellows are made from tube which is preformed from cold rolled sheet of accurate gauge, and joined with a longitudinal self-butt-weld. Various methods are used to make the convolutions, including hydraulic forming and several types of rolling.—*Teddington Aircraft Controls Ltd.*

Pressure resistance transducers

ON the Bourdon tube type the pressure responsive element consists of a hardened beryllium copper Bourdon tube, the movement of which is proportional to the applied pressure. Thus tube movements actuate a lever system to traverse a wiper over a precision wound potentiometer. To ensure maximum response and to obviate linkage backlash, all pivots and bearings are fitted with miniature precision grade ball bearings. The Bourdon tube is brazed into the support casting and the end-piece. The pickup wiper consists of two blades to ensure that electrical continuity is maintained even under conditions of vibration. An overload breaklink is incorporated in the lever system to prevent the wiper leaving the potentiometer on pressure overload. Two types are available at present. A fixed range model, such as 0-1,200 p.s.i., and a suppressed zero model, such as 250-500 p.s.i. On the suppressed zero model the Bourdon tube movement from zero to the start of the range is taken up by the linkage. All instruments will withstand 25% of the maximum pressure range overload without derangement. These instruments can be supplied filled with silicone fluid to provide damping when they will be subjected to conditions of vibration and acceleration, as in aircraft.

Each instrument is housed in an aluminium alloy die-cast circular case 2½ in. diameter by 1⅞ in. deep. A three-way screwed socket is provided for the electrical connection to take a 'cannon' plug.—*K.D.G. Instruments Ltd.*

GAS JOURNAL

Readers' Enquiry Service

Details and coupons are given on the backing page

Conductivity cells

A CONDUCTIVITY cell, connected to a suitable indicating instrument, is used to measure the specific conductivities of electrolytes, which can be made to flow through the cell or to be in continual contact with it. The majority of cells hitherto commercially available for industrial applications were made from glass, into which platinised platinum electrodes were sealed. To provide a measure of protection the tubular glass bodies of the cells were generally enclosd in metal tubes. The limitations of such cells were leaks and fractures due to imperfect sealing, and thermal shock were commonplace; periodic replatinising of the electrodes was essential. All of these shortcomings have been overcome in the design of the Electronic Switchgear range of patented cells, which are completely interchangeable without alteration to the calibration of the measuring instrument, and which may be handled in a casual manner without risk of damage.

Each type of cell in the Flowline cell, Series CCA, which is designed for flowline installation, has annular, impervious carbon electrodes which are flush with the bore of the cell. They are simple to clean by means of a bottle brush and do not restrict the through flow of liquid. The cell bodies, into which the electrodes are moulded, are of an inert plastic material that is resistant to attack by 10% solutions of sulphuric acid, hydrochloric acid and caustic soda. They are suitable for pressures and temperatures up to 100 p.s.i. and 80°C. respectively. Either end of the bore is tapped ¾ in. B.S.P. thread for convenient mounting in the pipeline. This series of cells finds extensive application on base exchange water softening plant, demineralised water plant, steam raising plants and in laboratories.

The Immersion cell, Series CCB, is designed for conditions of extreme pressure and temperature, and where the safe and efficient working of large and costly plant depends upon the consistently effective operation of the electrolytic conductivity measuring or controlling equipment. Of simple structure, the cell consists of a large highly glazed sintered alumina insulator carries a cylindrical electrode which is co-axial with the electrolyte sample tube that forms the second electrode. The surfaces of the electrodes undergo a special patented processing which imparts a tenacious coating of an inert material that inhibits polarisation; unlike platinum black, the coating cannot be removed by handling. The portion of the fitting which is normally immersed in the electrolyte is made from 18/8 quality stainless steel. This type of cell may be used for the measurement of steam condensate contained in hotwells.—*Electronic Switchgear (London) Ltd*

Clamps

A QUICK and cheap first aid for damaged pipes is provided by Band-It clamps, which can be used for all types of pressure or suction hose for air, steam, gas, water, petrol, oils, chemicals, etc. Made of stainless steel, these clamps can be used on any object—hose, pipe, vessel, pole, etc.—without any need to disconnect the article. With one roll of Band, it is possible to clamp all diameters from ½ in. to 30 in. without knowing the diameter beforehand, and this offers an endless number of both permanent and emergency uses for every type of industry.—*G. E. Simm (Engineering) Ltd.*

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If you would like more information on products and services mentioned in the advertisement or editorial pages of the 'Gas Journal', fill in the coupons below, *one for each enquiry*, and send in unsealed envelope to 'Readers Enquiry Service', Gas Journal, 11 Bolt Court, Fleet Street, London, E.C.4.

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A quick job — despite rock sub-strata and heavy rain

LAST MAJOR EXTENSION TO S.W. GAS GRID OPENED

NEWS SUPPLEMENT

THE last major extension to the gas grid in the South West was inaugurated by the Minister of Power, Mr. Richard Wood, last Friday. From Exeter new mains now stretch out to bring North Devon into the Board's integrated supply system, and the extension has resulted in the closing down of the gas-producing plant at Barnstable, Bideford, Ilfracombe and South Molton; North Tawton, Okehampton, Chagford and Moretonhampstead will follow shortly.

Describing the project as 'a very considerable and commendable co-operative effort which has been carried out cheaply, efficiently and remarkably quickly,' Mr. Wood said he hoped it would cause the householder and businessman to look again at gas, which in this area was not only fully competitive with other fuels at the present moment, but would remain so in the future.

The difficulties of routing a pipeline across country notorious for its rock sub-strata were emphasised by Mr. C. H. Chester, C.B.E., the Chairman of the Board, who explained that the project was further hampered by a winter in which the rainfall was 50% above average. Nevertheless, from the design stage to the completion of the 80 miles of mains the undertaking had taken only 12 months. Maximum use had been made of mechanical plant for trench excavation, reinstatement and pipe handling, and by means of a modified system of 'pipe-lining' the spun iron pipe had been laid at an average rate of two miles per week.

Mr. Chester said that maximum use had been made of wayleave agreements to

Continued on page 37

Wales : record size oxygen plant

A CONTRACT to build and operate the biggest tonnage oxygen plant serving the iron and steel industry in Western Europe has been placed with British Oxygen Gases, Ltd., by the Steel Company of Wales Ltd.

The plant, which is to be installed at the Margam works, will have a capacity of 566 tons of oxygen per day. It will also be the first tonnage oxygen plant for blast furnace enrichment in Western Europe. It is scheduled to come into operation by January, 1962.

Costing well over £1 mill., the plant will enrich by 4% a total blast volume of 200,000 cu.ft. of air a minute. Final oxygen content of the enriched blast will thus be 25%.

The Minister of Power, Mr. Richard Wood, turns the valve which connects North Devon to the South Western Gas Board's grid. The Board Chairman, Mr. C. H. Chester, (left) offers advice on which way it should go.

ENGINEERS VISIT DUNSTABLE'S NEW GAS-FROM-OIL PLANT

DUNSTABLE was the venue chosen by this year's Chairman, Mr. R. F. Robinson for the summer meeting of the London and Southern Section of the Institution of Gas Engineers. Members were able to inspect the new Onia-Gegi gas-from-oil plant completed last year by Humphreys & Glasgow Ltd. A 'green field' site has made possible a most spacious layout which, with the aluminium-painted vessels and the buildings of modern design, has given this 6-mill. cu.ft. a day plant a clean and thoroughly up-to-date appearance.

Built in two units of 3-mill. cu.ft. per day capacity, the plant is gasifying p.f.d., while medium fuel oil is being used for supplying heat to the plant on the 'blow' or heating period, and also for raising steam in three oil-fired Ruston and Hornsby boilers, each of 12,000 lb. of steam per hour at 150 p.s.i.—one standby.

This steam is in addition to waste heat steam raised by the gasmaking plant itself. Medium fuel oil can, however, be used for gasification. Gas oil has not been used since the early days of the plant's commissioning.

Well-equipped control room

The well-equipped control room is built on an elevated platform from which the attendant has a full view of the plant. Here are installed the two automatic operators controlling the working of each set and a full range of instruments make available all the necessary information about the working of the plant.

The ancillary plant has been painted in gay colours and the two Holmes-Connersville exhausters, steam driven by Sisson vertical engines are controlled by a neat device operated by the relief holder, by which suction is reduced should the holder be emptied.

The gas, with an organic sulphur content as low as 7 grams per 100 cu.ft., passes to a service holder of ½ mill. cu.ft. capacity before being boosted at 4 p.s.i. to Luton to meet a highly industrialised load.

Continued on page 37

W. MIDLANDS TO HAVE 13 - STOREY GAS H.Q.

£1 mill. building for Birmingham

PLANS to build a 13-storey modern office block at a cost of about £1 mill. to provide a new headquarters in Birmingham for the West Midlands Gas Board were announced at the summer meeting of the Midland Section of the Institution of Gas Engineers on July 1.

Mr. G. Le B. Diamond, Chairman of the West Midlands Gas Board, said that it was hoped to begin work on the foundations of the new building at a site in Broad Street, Birmingham, this year.

The new headquarters will take about two years to complete. It will bring under one roof staffs of the West Midlands Board who are at present scattered in eight different premises, and also provide accommodation for staff of the Birmingham division.

Some of the present premises are former private houses, which have leases due to expire in the near future. The Birmingham division is at present using office and showroom accommodation at Birmingham Council House, which is required by Birmingham Corporation for its own use.

Botanical gardens luncheon

Mr. Diamond made the announcement about the new headquarters at a luncheon at the Botanical Gardens, Birmingham, which members of the Midland Section of the Institution and their ladies attended at the invitation of the Chairmen and members of the East and West Midlands Gas Boards.

Proposing a toast to the City of Birmingham, he said the gas industry under nationalisation had maintained the standards of the former Birmingham gas undertaking in giving a service to the community at the lowest possible cost.

The Birmingham gas undertaking was very successful, and he thought he was right in saying that it contributed no less a sum than £2 mill. to the rates from its profits.

It also made a very notable contribution to the City of Birmingham in that money from the gas undertaking was used for the founding and building of the city's art gallery.

Home of gas industry

The Lord Mayor of Birmingham, Alderman Garnet B. Boughton, who was principal guest at the luncheon, said that he felt Birmingham was the traditional home of the gas industry.

It did not seem too many years ago that he went into a house in Queen's Head Road, Handsworth, Birmingham, which was the first house in the world to be lit by gas.

The Lord Mayor said he was a member of the City Council when the gas industry was nationalised. Members of the council had rather mixed feelings about it, but they felt that if Birmingham had nothing to gain by being taken over, they had very little to lose.

Whether Birmingham gained or lost, there was no doubt that the country as a whole gained, and that, of course, was the object of nationalisation.

Under the former set-up it was not, for instance, economical to run a gas pipe a mile to a farm. Now the gas industry was more of a service than a profit-making concern, and he was quite sure the country had gained by the service the gas industry had been able to give.

Appeal for coal

Alderman Boughton said that the gas industry was one of the biggest consumers of coal, the country's main raw material. He appealed that there should not be too much use of oil in the gas industry.

Mr. S. K. Hawthorn, Chairman of the Midland Section of the Institution, gave an assurance to the Lord Mayor on the use of oil in the gas industry.

He said that 90% of the therms produced by the industry were derived from coal, leaving only 10% from oil.

Entire sales force at three-day conference

THE entire sales force of Parkinson Cowan Industrial Products, manufacturers of radiant space-heating equipment, heat process plant, spirometers and gas meters, attended a three-day sales conference held in London recently.

Included in the conference programme were demonstrations of selling techniques, a quiz and brains trust conducted by Mr. H. N. Ballantyne, Sales Manager of Parkinson Cowan Industrial Products, a talk on 'Training for Marketing' by Mr. W. P. Bowden, Parkinson Cowan Group Personnel Officer, talks by manufacturers on paint-spraying equipment and methods, recent developments in conveying equipment and industrial gas meters.

Sales engineers also saw five films in the Gas Council cinema including the recent release entitled 'Developing Your Sales Personality.'

Day out in Bristol

MORE than eighty members of the Western Junior Gas Association from all over the West Country had a day out in Bristol and Gloucestershire recently.

During the morning the members, their wives and ladies, took sherry at J. R. Phillips & Co. Ltd., the Bristol wine merchants, and then toured the premises.

In the afternoon the Association's summer meeting and ladies' day concluded with a visit to the Wildfowl Trust at Slimbridge.

Mr. J. C. George, C.B.E., Parliamentary Secretary to the Ministry of Power, toured the Romford and Beckton works of the North Thames Gas Board recently to see how new developments are progressing. Inspecting the control room of the Romford reforming plant are, from left: Mr. J. A. Hepworth, Board Chief Engineer; Mr. A. Blackshaw, Ministry of Power; Mr. George; Mr. E. R. Stewart, Station Engineer; Dr. J. Burns, Deputy Chairman of the Board; and Mr. M. Milne-Watson, Chairman.

PERSONAL NOTES

Mr. W. A. Evetts

MR. W. A. EVETTS, M.C., Divisional Engineer, Watford Division of the Eastern Gas Board, will be retiring on July 31, after over 40 years in the gas industry. A nephew of the late Sir George Evetts, he was educated at Farnham Grammar School and Battersea Polytechnic where he was studying engineering until the outbreak of the first world war. He was commissioned in the Royal Artillery in October, 1914, serving the greater part of the war in France and later in Germany. He was a major for the last two years of his service, commanding a battery. He was mentioned in dispatches, awarded the Military Cross and made Chevalier of the Legion of Honour, the latter for services with the French Forces in 1918. He entered the service of the Watford Gas & Coke Company in 1920, and became assistant manager and engineer to that company in 1922. He was actively engaged as a works engineer, production engineer and later assistant chief engineer during the period of rapid expansion of the Watford and St. Albans Gas Company and at vesting date was made Watford divisional engineer. The eleven years since have been a period of great activity in the Watford Division, and Mr. Evetts was responsible for the planning and putting into operation the considerable engineering developments required to meet the gas requirements of the four new towns. He was a member of the I.G.E. Examining Board from October 1950 to July 1953; a lecturer at Brooklands Technical College; in 1955 he was chairman of the Eastern Section of the Institution. In May, 1952, for a paper to the Institution entitled 'Technical and Economic Aspects of the Gas Supply to Four New Towns' he was awarded the Institution Gold Medal.

MR. W. H. AINSWORTH, area manager for Ireland of Radiation Group Sales Ltd. has retired. Mr. Ainsworth joined the staff of John Wright & Company Ltd. prior to the first world war and spent some 40 years working in Ireland for the Radiation Group. He was President of the Irish Gas Association in 1959-60. MR. CHARLES G. S. ROLLS, who succeeds Mr. Ainsworth, was previously sales representative for the West Midlands Area. MR. F. J. ADAMS, previously water heater representative for the West-Midlands area, succeeds Mr. Rolls.

MR. MATTHEW REID MOORE, who became general sales manager of Richard Sutcliffe Ltd., Horbury, Wakefield, earlier this year, has now been promoted to the position of General Manager.

COKE OVEN CONTRACT

The £200,000 contract for the construction of a coke oven at the Spencer Works of Richard Thomas & Baldwins Ltd. was awarded to Simon-Carves Ltd. and not the Redheugh Iron & Steel Co. Ltd. as was stated in our June 22 issue.

CORRESPONDENCE

'The Architect and the Gas Engineer'

DEAR SIR,

In your report of the paper: 'The Architect and the Gas Engineer,' given at the 97th Annual General Meeting of the Institution of Gas Engineers a statement was made in the discussion that this association installed a gas heating system some years ago for the purpose of testing refrigerators.

May I say that this statement is entirely untrue and has no foundation whatsoever.

Yours faithfully,

J. I. BERNARD,

Director and Secretary,
British Electrical Development Assoc.,
2, Savoy Hill,
London, W.C.2.

June 23, 1960.

Mr. E. E. Blandon replies: My point was valid but my facts were erroneously stated: It was the Electrical Research Association, not the Electrical Development Association. I trust that the latter body will accept my apology for the mis-statement.

COMING EVENTS

July 15.—WALES G.C.C.: Town Hall, Llandudno. 11.0 a.m.

July 18.—EASTERN G.C.C. Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2. 2.0 p.m.

SOUTH-WEST GAS GRID COMPLETED

from page 31

lay the mains in privately owned land to avoid the disturbances of highways. Of the 80 miles of mains included in this project some 70 miles had been laid in private land, entailing the negotiation of 265 wayleave agreements with landowners. The laying of these pipelines included 182 road crossings and sections, 36 bridges and seven rail crossings.

While this work had been proceeding, said Mr. Chester, the Board had been engaged in the integration of other somewhat isolated towns in the major gas grid. Watchet and Minehead had been linked to Bridgwater by 24 miles of main and these towns would in future receive a gas supply chiefly from Weston-super-Mare. The gas production plant at Evesham would be closed down this year and the town would receive its gas supply from Cheltenham. These integration projects would result in an annual gross saving of £127,000, or a net saving per annum of £62,000 after meeting capital charges.

Mr. Chester remarked that his Board was the first in any nationalised industry to be able to announce its ability to be self-supporting for capital monies after this year. 'No doubt the Chancellor of the Exchequer will be delighted that this has taken place in an area covering his constituency with the promise that it gives of a reduction in the percentage of taxation,' he added.

The Chairman also made particular reference to the manufacture of Gloco and Gloco Nuts. The former was cheaper than the majority of other smokeless fuels, and they were now making about 450,000 tons per annum which could readily be extended to over half a million tons.

Before the ceremony at Stafford Bridge, near Exeter, where the new link main leaves the 12-in. diameter trunk main from Exeter to Tiverton and Tawton, the Minister had opened the Board's new service centre at Eastgate House, Exeter. The new showroom is situated in the new shopping centre facing an attractively-planned street of shops from which vehicles are banned, and will replace the Board's existing showroom at Southernhay East which is to be demolished.

Dunstable visit

from page 31

The three Waller boosters, two steam-driven and one diesel-driven are installed outside the exhaust house in the open. Here again, the well chosen colours for the ancillary plant add to the general impression of an excellent layout and a very clean plant, employing the minimum of labour.

The afternoon following the visit was spent at the London Gliding Club on Dunstable Downs. In spite of a heavy shower during lunch, the weather cleared to make gliding possible.

Members inspected the Club's workshops where repairs to gliders were being carried out and were later able to make short flights in two machines provided by the club and flown by its pilots. Two most interesting displays of aerobatics showed the great possibilities of manœuvre open to gliders and emphasised the skill with which an experienced pilot can make full use of air currents to keep him in the air or assist him in a change of direction.

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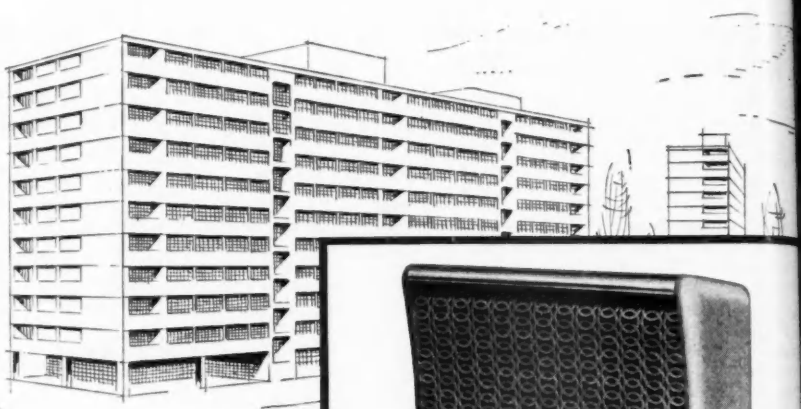

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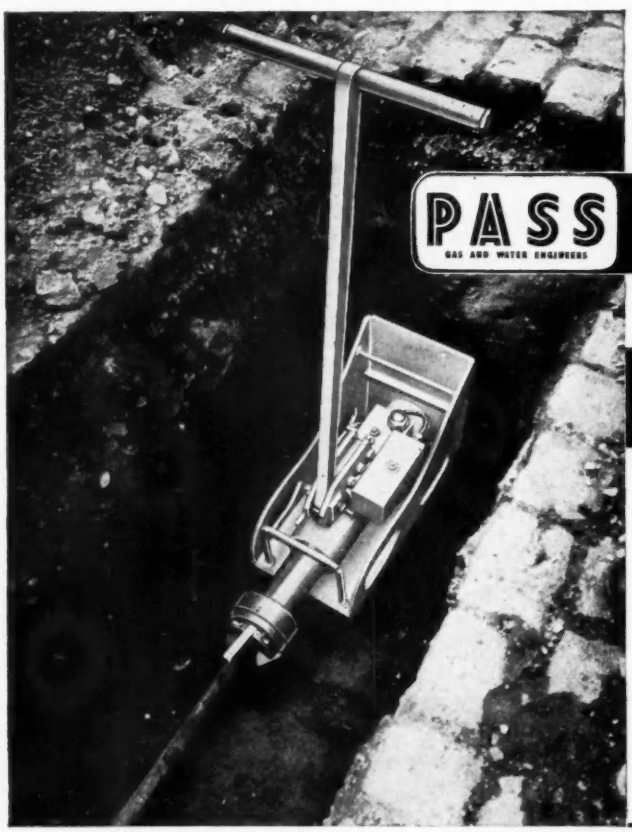

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